1. **Project Title:**   **Vegetation Classification, Inventory, and Ecological Integrity Assessment of the Wet Meadow Habitats at Malheur National Wildlife Refuge.**

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3. **Project Objectives:**

In summary, the objectives of this biotic inventory would contribute greatly to the construction of a solid foundation for wet meadow management on the Refuge and the wildlife that it supports (e.g. Oregon spotted frog, a candidate T&E species). Refuge management of this habitat type is very controversial and receives national attention. The project develops a collaboration team including USFWS (Refuge and Regional Office staff), Natureserve, the Refuge's Ecology Work Group, and Oregon Natural Heritage Program to classify dry/wet meadow habitat types that will serve as the cornerstone for creating the Malheur State-and-Transition Model as specified in Malheur CCP Objective 4a (which deals with issues pertaining to succession, phenology, etc.).   In addition, education/training and experience received by Refuge staff on NVCS protocols and methods will be shared with other refuges through the coordination of the zone biologist and Region 1 I&M Program.

The primary objectives of this project are to develop a vegetation classification of wetland habitats within the standards of the NVC, conduct an ecological integrity assessment of the wetlands, and support the mapping of vegetation resources of the Malheur wildlife refuge.

This will also assist the Refuge and partners in developing the Malheur State-and-Transition Model (STM). Identified as a priority in the 2012 Refuge CCP, the STM concept for Malheur Refuge expands beyond greater ecological understanding of Refuge and similar habitats by providing transparency, heightened and continued interaction with partnering agencies/organizations (i.e., Oregon State University, U.S. Department of Agriculture's Agricultural Research Service, Oregon Heritage Program, Ducks Unlimited, Wetlands Conservancy, etc.), and accountability for continued monitoring of management actions as well. The STM is a living model that is continually transformed as new information is gleaned over time, and because of this, it introduces an amplified dependence on actualized adaptive management. It also provides us with a framework for organizing our results and reporting them to the interested public.   In addition, the STM that will begin to take shape based on this work will be used by OSU Extension Service to help neighboring landowners gain an enhanced understanding of wet meadow management issues.

4. **Methods:**

Vegetation Classification/Mapping
The first and third objective will be met through intensive field data collection and quantitative data analysis to develop plant associations of the wetland habitats on the refuge. The Oregon

Biodiversity Information Center will conduct the field data and quantitative data analysis to develop the plant associations. NatureServe will assist with field method standardization and classification development, and will develop/ and place the plant associations into the NVC upper units (Alliance, Groups and higher). The classification will be coordinated with existing Oregon and NVC classification units. The classification of wetland habitats for Malheur will be part of the Oregon State Classification and the National Vegetation Classification.   Historic plant community data will also be incorporated.

Field data collection will be conducted at $\geq$80 sites, systematically chosen in order to capture the variation of plant communities, hydrology, and soils within the Refuge. Species canopy cover, soil, and depth to water table will be evaluated in 0.1 ha plots. PcOrd will be used to classify the sample sites into plant associations consistent with NVCS standards. Ecological condition assessments will also be conducted using information already being collected in selected plots.

5. Project Implementation Timeline:

Field work will be conducted in July 2012 with follow-up classification, assessment, and GIS work completed by December 2012. A report summarizing methods and findings and the database upgrades will also be completed in December 2012.

6. Connection to Funding Priorities:

Priority 1: Baseline data such as plant community composition, condition, and seral stage, is largely lacking for wet meadows. This project would provide a foundation for wet meadow management that is defensible via the use of protocols that are embraced nationally.

Priority 2: The product of this project would provide the cornerstone for the Malheur State-and-Transition Model, which serves as the foundation for adaptive habitat management for this Refuge as mandated in its 2012 draft CCP.

Priority 3: The Refuge and the Regional Office are providing GIS personnel to capture all collected data in order to further develop the Refuge Habitat Geodatabase and incorporate spatial association information into the Refuge Habitat Management Database. BIOTICS database management and EIA database product development is also included.

Priority 4: This project provides the creation of protocols documenting sampling, classification, and mapping of plant associations that can be applied across refuges.

Priority 5: The Refuge does not require additional equipment to address I&M needs.

7. Project Justification:

Accurate and consistent vegetation maps can provide multiple benefits for wildlife refuge management decision support, scientific analysis, and monitoring for habitat objectives and climate change. Previous vegetation mapping efforts of NFW refuges have identified several challenges in implementing a standard protocol and best practices for systematic vegetation mapping. Some challenges have included: lack of understanding of the accepted federal vegetation classification standard (the National Vegetation Classification Standard, or NVCS);

how the standard should be applied to refuge landscapes at multiple scales and to highly modified and managed habitats; methodologies that were difficult to repeat; and lack of a coordinated FWS program to manage, map, and store vegetation data across refuges. In addition, vegetation inventories of the refuges may serve more than just a mapping role; assessments of vegetation in conjunction with hydrology, soils, and stressors, can provide critical information on the condition of refuge habitats for species such as the Columbia spotted frog (federal candidate species) and the greater sandhill crane (Pacific Flyway Council priority). Efficient management of the meadows could also benefit redband trout, a federal species of concern.   In addition to providing information critical to management of Malheur NWR, this project would build on previous pilot methods for vegetation classification and mapping on other refuges in Region 1 (e.g. Camas).

Benefits region-wide include the fine-tuning of mapping and classification protocols and the establishment of alliances and association classes currently absent from the NVCS yet found on refuges (e.g. Sheldon, Gray's Lake) and wetlands (e.g. Warner Wetlands, Summer Lake) falling under multiple LCCs.

This project supports Malheur CCP Goal 4, Objectives 4a, 4b, 4d; and Goal 5, Objective 5a by providing foundational information regarding plant associations needed in "using tolerance thresholds specific to each plant community as determined by the Malheur Refuge State-and-Transition Model to influence management prescriptions to meet annual and long-term wet meadow habitat objectives" through applied adaptive management (Malheur CCP 2-42).

This project would also involve a large network of partnerships, including those between the Refuge, Regional Office, Oregon Natural Heritage Program, Agricultural Research Service, Wetlands Conservancy, and Ducks Unlimited, all of which are actively involved in the development of the STM through their participation in the Ecology Work Group, a Refuge-habitat think-tank that was formed through the CCP process due to the high likelihood of litigation involving the Refuge's highly controversial wetland management practices (i.e. rakebunch grazing and haying).

8. Project Deliverables:

1. Plot and condition data for wet meadow sample sites (July).
2. Standard Classification of wet meadow plant associations, placed into the National Vegetation Classification, providing upper levels of Alliance, Group, Macrogroup, etc. (December).
3. Descriptions for each plant association, including site conditions, hydrology, and management recommendations as needed (December).
4. Description for each NVC Group, cross walked to Habitat type (December).
5. Protocols documenting sampling, classification, and mapping of plant associations (December).
6. Key elements to be used in development of STM (on-going).
7. ArcMap shape files showing plot locations and updated extent of wet meadow plant associations as needed (October).
8. Ecological Integrity field forms and database for points collected on the Refuge (Access database).

9. Statistical Assistance/GIS Support:

The budget includes statistical assistance provided by Natureserve and The Wetlands Conservancy.   GIS support is cost-shared by the Refuge and Regional Office Refuge Information Branch.

10. Requested Funding:

INR-ORBIC Budget $30,845
       (at least 20 field days in July 2012 (10 days Christy, 10 days contractor), and the balance of time will be spent at INR-ORBIC analyzing and reporting data, and coordinating with FWS, Nature Serve, TWC, and the Ecology Working Group.)
NatureServe Budget $11,280
       (5 days travel/field time for ecologist and 6 days for classification coordination, BIOTICS database management and EIA database product development)

Total Proposal Budget $42,125